

## ABSTRACT

The invention relates to a fiberoptic current or magnetic field sensor having a plurality of sensor heads (H), and to a corresponding measurement method. The sensor has: a light source (1);  $N \geq 2$  sensor heads (H); at least one phase modulation unit (PME) having at least one phase modulator (PM); a detector (2); a control and evaluation unit (5). The at least one phase modulation unit (PME) is optically connected to at least one of the sensor heads (H). Linearly polarized lightwaves can be differentially phase-modulated in a non-reciprocal fashion by means of the at least one phase modulation unit (PME).  $N$  modulation amplitudes  $\phi_{0,n}$  and  $N$  modulation frequencies  $\nu_n$  are provided for the non-reciprocal differential phase modulations, the modulation frequencies  $\nu_n$  and two prescribable positive whole numbers  $p, q$  with  $p \neq q$  being selected in such a way that it holds for all positive whole numbers  $z$  and for all whole numbers  $n, m$  with  $n \neq m$  and  $1 \leq n, m \leq N$  that:

$$p \cdot \nu_n \neq z \cdot \nu_m \text{ and} \\ q \cdot \nu_n \neq z \cdot \nu_m.$$

The modulation amplitudes  $\phi_{0,n}$  and the modulation frequencies  $\nu_n$  are selected as a function of modulation-relevant optical path lengths  $\ell_n$ . An improved signal-to-noise ratio can be achieved.

(Figure 4)